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| **The 4th Meeting of the APT Conference Preparatory**  **Group for WRC-19 (APG19-4)** | **APG19-4/OUT-18** |
| 7 – 12 January 2019, Busan, Republic of Korea | 12 January 2019 |

Working Party 1

**PRELIMINARY VIEWs on WRC-19 agenda item 1.15**

**Agenda Item 1.15**

*to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with Resolution* ***767 (WRC-15)****;*

1. **Background**

In accordance with Resolution **767 (WRC-15)**, WRC-19 was invited:

*taking into account the results of ITU-R studies on sharing and compatibility between passive and active services as well as spectrum needs for those services, to consider identification for use by administrations for the land-mobile and fixed service applications operating in the frequency range 275-450GHz, while maintaining protection of the passive services identified in No.* ***5.565****, and take appropriate action.*

Recent ITU-R and APT studies are as follows:

* Report ITU-R [F.2416](https://www.itu.int/pub/R-REP-F.2416) “Technical and operational characteristics and applications of the point-to-point fixed service applications operating in the frequency band 275-450 GHz”;
* Report ITU-R [M.2417](https://www.itu.int/pub/R-REP-M.2417) “Technical and operational characteristics of land-mobile service applications in the frequency range 275-450 GHz”;
* WP 1A – WDPDN Report ITU-R SM.[275-450GHZ\_SHARING] (Doc. [1A/340](https://www.itu.int/md/R15-WP1A-C-0340/en) Annex 3);
* WP 5A – WDPDR Report ITU-R M.2417-0 “Technical and operational characteristics of land-mobile service applications in the frequency range 275-450 GHz” (Doc. [5A/976](https://www.itu.int/md/R15-WP5A-C-0976/en) Annex 24);
* WP 5C – Elements for consideration on future revisions of Recommendations ITU-R F.699, ITU-R F.1245 and Report ITU-R F.2416 (Doc. [5C/617](https://www.itu.int/md/R15-WP5C-C-0617/en) Annex 2);
* WP 7C – Draft new Report ITU-R RS.[275-450 GHZ CHARS] (Doc. [7/102](https://www.itu.int/md/R15-SG07-C-0102/en));
* WP 7D – Draft revision of Report ITU-R RA.2189 (Doc. [7/96](https://www.itu.int/md/R15-SG07-C-0096/en));
* AWG – APT Report on "Short Range Radiocommunication Systems and Application Scenarios Operating in the Frequency Range 275-1000GHz" (Doc. APT/AWG/REP-66).

Summary of Methods in draft CPM report:

* **Method A**: No change to the Radio Regulations.
* **Method B**: Modifying the existing footnote RR No. **5.565** is proposed for FS/LMS applications in portions of the 275-450 GHz frequency range.
* **Method C**: Modifying RR No. **5.565** for use by FS/LMS applications in portions of the 275-450 GHz band, while considering the evolving guidance of ITU R Recommendations and Reports.
* **Method D**: Adding a new footnote RR No. **5.A115/5.B115** is proposed for FS/LMS applications in portions of the 275-450 GHz band. There are two different options, **Option 1** and **Option 2** which consider the identification of different frequency bands based on the results of the studies.
* **Method E**: Adding a new footnote RR No. **5.C115** and modifying the existing footnote RR No. **5.565** are proposed for FS/LMS applications in portions of the 275-450 GHz band.

1. **Documents**

* Input Documents: APG19-4/INP-15 (AUS), INP-22 (NZL), INP-29 (THA), INP-59 (JPN), INP-73 (KOR), INP-100 (CHN), INP-117 (IND), INP-66 (JPN), INP-103 (CHN).
* Information Documents: APG19-4/ INF-02 (WMO), INF-03 (IARU), INF-22 (CITEL), INF-23 (CEPT), INF-24 (RCC), APG19-4/INP-09 (APG Chair).

1. **Summary of Discussions**
   1. **Summary of Members’ view**
      1. **Australia (APG19-4/INP-15)**

Australia supports the identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275‑450 GHz, in accordance with Resolution **767 (WRC-15)** noting the need to maintain protection of the passive services identified in Radio Regulations No. **5.565**.

Australia supports Method C in the Draft CPM Report text for this agenda item. That is, identify frequency bands that are compatible with both EESS (passive) and RAS with respect to the land-mobile and fixed services applications by modification of footnote **5.565** in the Radio Regulations.

Preliminary studies show compatibility between EESS (passive) and RAS in all bands in the range 275-450 GHz except [296-306 GHz, 313-320 GHz and 331-356 GHz]. The remaining spectrum can be identified for land-mobile and fixed services applications subject to finalisation of studies.

* + 1. **New Zealand (APG19-4/INP-22)**

New Zealand supports the allocation of fixed and land mobile services in portions of the 275-450 GHz band to facilitate the development of innovative radiocommunication technologies utilising frequency range above 275 GHz by active services, such as fixed and land-mobile services, as long as such active service applications would not cause harmful interference to those passive service applications as indicated in RR No. **5.565**.

* + 1. **Thailand (APG19-4/INP-29)**

Thailand supports the identification of frequency bands for fixed and mobile service applications in the range 275-450 GHz while maintaining the protection of the passive services identified in RR. **No. 5.565**.

* + 1. **Japan (APG19-4/INP-59)**

Japan supports the work conducted by WP 5A and WP 5C on a revision of Reports ITU-R M.2417 and F.2416, respectively.

Japan supports ITU-R studies to identify candidate frequency bands for use by systems in the land-mobile and fixed services conducted by WP1A. Japan also supports identified frequency bands for land-mobile and fixed service applications, taking into account technical and operational characteristics specified by the most recent work conducted by WP 5A and WP 5C on a revision of Reports ITU-R M.2417 and F.2416, respectively.

Japan is of the view that the passive services identified in RR No.**5.565** should be protected from interference caused by LMS and FS applications planned to be operated.

* + 1. **Korea (APG19-4/INP-73)**

Korea support the ITU-R studies to consider identification of frequency bands for use by the land-mobile and fixed service applications operating in the frequency range 275-450 GHz, provided that the protection of passive services identified in RR No.**5.565** is ensured. If such identification is made, APT Members support revising relevant part of the Radio Regulations.

* + 1. **China (APG19-4/INP-100)**

China is of the view that:

* The bands 296-306 GHz, 313-320 GHz and 330-356 GHz currently identified for EESS (passive) in RR No. **5.565** cannot be made available to the FS/LMS. China is also not support the identification of 361-365 GHz to the FS/LMS, at this stage.
* It is not necessary to propose the whole 94 GHz bandwidth of 356-450 GHz for identification for the FS/LMS applications. For example, only identify 400-420 GHz for the FS/LMS applications.
* In the bands identified for RAS in RR No. **5.565** (275-323 GHz, 327-371 GHz, 388-424 GHz and 426‑442 GHz), separation distances and/or avoidance angles between RAS stations and FS stations should be considered depending on the deployment environment of FS stations.
  + 1. **India (APG19-4/INP-117)**

In view of India the Method B satisfies this agenda item and may be applied to the candidate frequency bands.

**Method B -** Modifying the existing footnote RR No. **5.565** is proposed for FS/LMS applications in portions of the 275-450 GHz frequency range.

**Reasons:**Studies that evaluated the entire 275-450 GHz frequency range show sharing is feasible between FS/LMS applications and the EESS (passive)/RAS in the particular bands. For frequencies in the range 275-450 GHz not [identified/designated] for use under Method B, current studies have shown that sharing between FS/LMS applications and EESS (passive)/RAS applications is not feasible. Method B identifies frequency bands for use by LMS and FS applications that meet the spectrum needs summarized in various ITU-R studies as mentioned in the section 1/1.15/3 of draft CPM text.

* 1. **Summary of issues raised during the meeting**

Summary of Proposed Methods prior to APG 19-4 as below:

**Table 1 - Summary of Proposed Methods in Current Version of Draft CPM Report**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Methods** | **Action** | **Application Services** | **Proposed Bands for Services** | | | |
| **Band 1 (GHz)** | **Band 2 (GHz)** | **Band 3 (GHz)** | **Band 4 (GHz)** |
| A | No change to RR | - | - | - | - | - |
| B | Modify RR | FS & LMS | 275-296 | 306-313 | 318-333 | 356-450 |
| C | Modify RR | FS & LMS | 275-296 | 306-313 | 320-330 | 356-450 |
| D Opt. 1 | Add footnote 5A115 | FS & LMS | 275-296 | 306-313 | 320-330 | 356-450 |
| D Opt. 2 | Add footnote 5B115 | FS | 275-296 | 306-313 | 319-325 | - |
| LMS | 275-325 | | | - |
| E | Modify RR and  Add footnote 5C115 | FS & LMS | 275-296 | 306-313 | 318-333 | 356-450 |

INP-66 proposed to remove Method D Option 2 and replace with Method F.

INP-103 proposed to add Method G with adding a new footnote.

Summary of the Proposed Methods become:

**Table 2 - Summary of Proposed Methods Agreed in APG19-4**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Methods** | **Action** | **Application Service** | **Proposed Bands for Service** | | | |
| **Band 1 (GHz)** | **Band 2 (GHz)** | **Band 3 (GHz)** | **Band 4 (GHz)** |
| A\* | No change | - | - | - | - | - |
| B\* | Modify RR | FS & LMS | 275-296 | 306-313 | 318-333 | 356-450 |
| C\* | Modify RR | FS & LMS | 275-296 | 306-313 | 320-330 | 356-450 |
| D\* | Add footnote 5A115 | FS & LMS | 275-296 | 306-313 | 320-330 | 356-450 |
| E\* | Modify RR and  Add footnote 5B115 | FS & LMS | 275-296 | 306-313 | 318-333 | 356-450 |
| F | Add footnote 5C115 | FS | 275-296 | 306-313 | 318-336 | 348-450 |
| LMS | 275-450 | | | |
| G | Add footnote 5D115 | FS & LMS | 275-296 | 306-313 | 320-330 | 400-420 |

\* These methods are existing proposals in the current draft CPM report

1. **APT Preliminary Views**

APT Members support the ITU-R studies to consider identification of frequency bands for use by the land mobile and fixed service applications operating in the frequency range 275-450 GHz, taking into account the most recent work conducted by WP 5A and WP 5C on a version of Reports ITU-R M.2417 and F.2416, respectively, as well as the spectrum needs, provided that the protection of passive services identified in No. **5.565** is ensured. If such identification is made, APT Members support revising the existing footnote and/or adding a new footnote to the relevant part of the Radio Regulations.

APT Members are also of the view that, in the bands identified for RAS in RR No. **5.565** (275-323 GHz, 327-371 GHz, 388-424 GHz and 426‑442 GHz), separation distances and/or avoidance angles between RAS stations and FS stations should be considered depending on the deployment environment of FS stations.

1. **Other Views from APT Members**

Some APT Members support possible identification of FS applications in all bands in the frequency range 275-450 GHz, except 296-306 GHz, 313-320 GHz and 330-356 GHz. Their view may change pending further studies in WP 1A.

Some APT Members do not support the identification of 296-306 GHz, 313-320 GHz and 330-356 GHz for the FS applications because the current outcomes of sharing and compatibility studies in ITU-R WP 1A shows infeasibility between FS application and EESS (passive).

Some APT Members support possible identification of LMS applications in the entire band in the frequency range 275-450 GHz. Their view may change pending further studies in WP 1A.

Some APT Members do not support identification of LMS/FS applications in the frequency bands within the frequency range 275-450GHz if the result of sharing and compatibility studies between LMS/FS application and passive services identified in RR No.**5.565** indicates that sharing is not feasible.

Some APT Members support to the work conducted by WP 5A and WP 5C on a revision of Reports ITU-R M.2417 and F.2416, respectively.

Some APT Members do not support the identification of 361-365 GHz to the FS/LMS at this stage. Their view may change pending further studies in WP 1A.

Some APT Members are of the view that it is not necessary to propose the whole 94 GHz bandwidth of 356-450 GHz for identification for the FS/LMS applications, taking into account the spectrum needs summarized in ITU-R studies as contained in section 1/1.15/3 of the current version of draft CPM text.

Some APT Members are of the view that the term “designated” is better replaced with the term “identified” in Methods as it has been used in the existing RR No. **5.565**.

1. **Issues for Consideration at next APG Meeting**

Differences in the Methods can be divided into two main categories:

* Modification of RR or addition of footnote or both.
* Differences in frequency identification, particularly in Band 3 and Band 4 (refer to Table 2 in Section 3.2).

Members are encouraged to focus the discussions on harmonizing the two items above, taking into account the outcome of CPM 19-2.

1. **Views from Other Organisations**

This section summarizes the views/positions of other regional groups and international organisations.

* 1. **Regional Groups**

**7.1.1 CITEL (APG19-4/INF-22)**

Different proposals based on Methods C and D are under consideration.

**7.1.2 CEPT (APG19-4/INF-23)**

CEPT supports the inclusion of a new footnote to Article **5** of the Radio Regulations identifying the following frequency bands for fixed and mobile service applications in the range 275-450 GHz while maintaining the protection of the passive services identified in RR No. **5.565**: 275-296 GHz, 306-313 GHz, 318-333 GHz and 356-450 GHz.

With a total bandwidth of 137 GHz, CEPT stresses that this is exceeding the assessed spectrum requirements of the land mobile and fixed services. In addition to the 23 GHz already allocated to land mobile and fixed services in the lower adjacent band 252-275 GHz, this is hence providing a contiguous band of 44 GHz.

However, CEPT does not support land mobile and fixed services identification in the EESS (passive) bands 296-306 GHz, 313-318 GHz and 333-356 GHz (as identified in RR No. **5.565**) since study results show that they are not compatible.

Active services other than land mobile and fixed services are not subject to WRC-19 agenda item 1.15. Consequently, CEPT is of the view that the corresponding regulatory provisions to other active services have to remain unchanged.

**7.1.3 RCC (APG19-4/INF-24)**

The RCC Administrations consider it reasonable that identification of frequency bands for land-mobile and fixed service applications in 275-450 GHz band in the RR No. **5.565** will facilitate global harmonization of radio frequencies for development and introduction of land mobile and fixed service applications above 275 GHz.

The RCC Administrations consider that when identifying frequency bands for active services in 275-450 GHz range, a balance of interests has to be observed in the use of this frequency range by both active and passive services, ensuring possibility for future development of new active service applications while excluding interferences to the passive services in the frequency bands already identified in No. **5.565** of the Radio Regulations.

The RCC Administrations support inclusion in RR No. **5.565** of the frequency bands 275-296 GHz, 306-313 GHz, 318-333 GHz and 356-450 GHz to be used by applications in the land mobile and fixed services (Method E).

* + 1. **ASMG (**[Document WRC-19-IRWSP-18/18](https://www.itu.int/md/R15-2NDWRC19PREPWORK-C-0018/en) **within APG19-4/INP-09R1)**

ASMG support the current studies to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, while ensuring the protection of passive services identified in No **5.565**, and not adding any additional constraints on these services and the possibility to support the only method proposed to satisfy this Agenda Item.

**7.1.5 ATU (**[Document WRC-19-IRWSP-18/6](https://www.itu.int/md/R15-2NDWRC19PREPWORK-C-0006/en) **within APG19-4/INP-09R1)**

ATU supports Method C, which suggests modifying RR No. **5.565** for use by fixed service land mobile service applications in portions of the 275-450 GHz band, while considering the evolving guidance of ITU R Recommendations and Reports. Studies that evaluated the entire 275-450 GHz range show that sharing is feasible between applications in the land mobile/fixed service, and applications in the Earth exploration satellite service (passive)/radio astronomy service in the particular frequency bands: 275-296 GHz, 306-313 GHz, 320-330 GHz and 356-450GHz.

* 1. **International Organizations**

**7.2.1 WMO (APG19-4/INF-02)**

In general, WMO does not oppose the identification of land-mobile and fixed services in part of the 275-450 GHz band provided that protection of EESS (passive) is ensured and the identification is consistent with footnote RR No. **5.565**.

The bands 296-306 GHz, 313-320 GHz and 331-356 GHz should not be considered because fixed and land mobile services would not be compatible with the EESS (passive).

* + 1. **IARU (APG19-4/INF-03)**

In considering identification of frequency bands for the land-mobile and fixed service application in the frequency range of 275-450 GHz, the IARU is of the view that whichever method is taken, access for non-commercial experimentation by stations in the amateur service to as much of the frequency range as possible be maintained.

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